U.S. Department of Transportation

Federal Aviation Administration

Advisory Circular

Subject: GENERIC VISUAL GLIDESLOPE INDICATORS (GVGI)

Date: DRAFT

Initiated by: AAS-100

AC No: AC 150/5345-52A

Change:

1. PURPOSE. This advisory circular (AC) contains the Federal Aviation Administration (FAA) standards for generic visual glideslope indicator (GVGI) systems. GVGI systems provide pilots with visual glideslope guidance during approaches for landing at general aviation airports.

2. APPLICATION. These standards are recommended by the FAA for general aviation airport applications, and systems meeting these standards are eligible for funding under the Airport Improvement Program.

3. EFFECTIVE DATE. Effective 6 months after the date of this circular, only equipment qualified per this specification will be listed in AC 150/5345-53, *Airport Lighting Equipment Certification Program.*

4. CANCELLATION. AC 150/5345-52, *Generic Visual Glideslope Indicators (GVGI)*, dated June 21, 1988, is cancelled.

5. PRINCIPAL CHANGES. The following principal changes are incorporated:

a. The beam pattern for Type L-883 units (single projector) is updated.

b. Engineering Brief #67 is referenced for GVGI units that may use alternative lighting devices (ALDs) as the projector light source.

c. GVGI day/night intensity settings are more consistent with Precision Approach Path Indicator (PAPI).

d. GVGI lightning protection is updated to the requirements of IEEE/ANSI C62.41 category C1.

6. METRIC UNITS. To promote an orderly transition to metric units, this AC includes both English and metric dimensions. The metric conversions may not be exact equivalents, and until there is an official changeover to the metric system, the English dimensions will govern.

7. COPIES OF THIS AC. The Office of Airport Safety and Standards makes this AC available online at www.faa.gov.

DAVID L. BENNETT
Director of Airport Safety and Standards

CHAPTER 1. SCOPE AND CLASSIFICATION.

1.1 Scope.

This specification covers the requirements for generic types of visual glideslope indicators for general aviation airports; i.e., airports not operating under Federal Aviation Regulation, Part 139, *Certification of Airports*.

1.2 Classification.

The generic visual glideslope indicator (GVGI) systems must be as classified below:

1.1.1 Types.

a. Type L-882 Systems - Multiple projector systems.

b. Type L-883 Systems - Single projector systems.

1.1.2 Styles.

a. Style A - Voltage powered systems.

b. Style B - Current powered systems.

1.1.3 Classes.

a. Class I - Systems that operate between +130 degrees Fahrenheit (F) (+55 degrees Celsius (C)) and -30 degrees F (-35 degrees C).

b. Class II - Systems that operate between +130 degrees F (+55 degrees C) and -65 degrees F (-55 degrees C).

Intentionally left blank.

CHAPTER 2. APPLICABLE DOCUMENTS.

The following documents form part of this specification and are applicable to the extent specified herein:

2.1 Federal Aviation Administration (FAA) Publications.

a. FAA Advisory Circulars (AC).

AC 150/5345-10	*Specification for Constant Current Regulators and Regulator Monitors*
AC 150/5345-26	*Specification for L-823 Plug and Receptacle. Cable Connectors*
AC 150/5345-28	*Precision Approach Path Indicator (PAPI) Systems* (for information only)
AC 150/5345-47	*Specification for Series to Series Isolation Transformers for Airport Lighting Systems*
AC 150/5345-49	*Specification L-854, Radio Control Equipment*
AC 150/5345-53	*Airport Lighting Equipment Certification Program*

b. FAA Standards and Drawings.

Drawing C-6046	*Frangible Coupling, Type 1 and lA, Details*

c. FAA Engineering Briefs.

Engineering Brief #67	*Light Sources Other Than Incandescent or Xenon for Airport and Obstruction Lighting Fixtures*

2.2 Military Specifications and Standards.

MIL-STD-810F 1 January 2000	*Department of Defense Test Method Standard For Environmental Engineering Considerations and Laboratory Tests*

2.3 Society of Automotive Engineers.

SAE AS25050	*Colors, Aeronautical Lights and Lighting Equipment, General Requirements For*

2.4 Institute of Electrical and Electronics Engineers (IEEE).

C62.41-1991	*IEEE Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits*

C62.45 -1991 *IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits*

2.5 Document Sources.

FAA ACs may be obtained from:

U.S. Department of Transportation
Subsequent Distribution Office
Ardmore East Business Center
3341 Q 75th Ave.
Landover, MD 20785
Telephone: (301) 322-4961
FAX: (301) 386-5394
Website: www.faa.gov/airports_airtraffic/airports/resources/advisory_circulars/

FAA Engineering Briefs may be obtained from:

U.S. Department of Transportation
Subsequent Distribution Office
Ardmore East Business Center
3341 Q 75th Ave.
Landover, MD 20785
Telephone: (301) 322-4961
FAX: (301) 386-5394
Website: www.faa.gov/airports_airtraffic/airports/construction/engineering_briefs/

Federal specifications and standards may be obtained from:

Federal Supply Services
Specification Section
470 L'Enfant Plaza East
SW Suite 8100
Washington, DC 20407
Telephone: (202) 619-8925
FAX: (202) 619-8985
Website: www.dsp.dla.mil

Military specifications and standards publications may be obtained from:

DAPS/DODSSP
Building 4, Section D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Telephone: (215) 697-2179
FAX: (215) 697-1460
Website: dodssp.daps.dla.mil

SAE standards may be obtained from:

SAE World Headquarters
400 Commonwealth Drive
Warrendale, PA 15096-0001
Telephone: (724) 776 4841
FAX: (248) 273 2494
Website: www.sae.org

IEEE Standards may be obtained from:

Telephone: (877) 413 5184
Website: http://global.ihs.com

Intentionally left blank.

CHAPTER 3. REQUIREMENTS.

3.1 Approval Process.

The GVGI approval process consists of Phase 1, a signal concept flight evaluation, and Phase 2, equipment performance testing. Proposed system designs must complete and pass both phases in sequence before approval is granted. Under Phase 1, a GVGI design installation will be flight tested by the FAA. A flight pattern will be flown several times both day and night. Glideslope sector signals will be observed and recorded. Observed items will include but not be limited to: ease of interpretation, possible signal conflict with airport equipment (example: airport beacons, support equipment, fire and rescue vehicle lighting), conspicuity, and color. Phase 2 tests consist of environmental, photometric, mechanical, and operational tests. The failure of the equipment to pass all tests will be cause for rejection.

3.1.1 Application for Approval.

Procedures for applying for qualification approval to this specification are detailed in AC 150/5345-53, *Airport Lighting Equipment Certification Program.* The application for approval must include at a minimum: detailed drawings which indicate the principle of operation and photometric data consisting of isocandela curves showing all glideslope sector signals and data for horizontal and vertical beam spread. Under Phase 1, the design will be evaluated using the design requirements in paragraph 3.3 as a guide. If the review indicates the criteria can be met, a Phase 1 evaluation will be scheduled.

3.1.2 Signal Concept Flight Evaluation.

The FAA will select the test site. The equipment to be tested must be supplied by the manufacturer. The FAA may install the equipment per the manufacturer's instructions or the manufacturer (with the approval of the FAA) will perform the installation. The flight test and evaluation will be performed by the FAA. A copy of the flight test report and test procedures must be given to the manufacturer upon conclusion of the evaluation.

3.1.3 Approved Design Data.

The FAA may recommend changes or approve the proposed system design contingent on incorporation of FAA recommendations during Phase 1 tests and reviews. Photometric and signal characteristics of the revised design must be submitted to the FAA prior to the conduct of Phase 2 tests.

3.1.4 Previous Approvals.

Proposed systems employing signal concepts identical to signals generated by FAA approved equipment per AC 150/5345-53 will not require Phase 1 testing. However, Phase 2 testing will be required. Precision Approach Path Indicator (PAPI) systems listed in AC 150/5345-53 that are approved per AC 150/5345-28 are considered as meeting both the Phase 1 and 2 requirements of this specification.

3.2 Environmental Requirements.

The equipment must be designed for outdoor installation and continuous or intermittent operation (with routine maintenance) for a 20-year service life under the following environmental conditions:

a. Temperature. For Class I systems, any temperature from -30 degrees F (-35 degrees C) to 130 degrees F (55 degrees C). For Class II systems, any temperature from - 65 degrees F (-55 degrees C) to 130 degrees F (55 degrees C).

b. Humidity. Any relative humidity to 95 percent.

c. Wind-blown Rain. Exposure to wind-blown rain from any direction.

d. Wind. Exposure to wind speeds up to 100 miles per hour (mph) (161 kilometers per hour (kp/h)) from any direction.

e. Dust. Exposure of the equipment to windblown dust.

NOTE: *Ingress of dust is not totally preventable, but dust must not penetrate in a quantity to interfere with operation of the equipment or to impair safe operation.*

e. Salt Spray. Exposure to a salt-laden atmosphere.

f. Sunshine. Exposure to solar radiation.

3.3 Design Requirements.

NOTE: *For manufacturers desiring to use alternative light devices (ALDs) (devices other than incandescent or xenon: light emitting diodes, cold cathode, or other light emitting devices) in GVGI systems, there are additional requirements for both device design and testing. See FAA Engineering Brief #67, Light Sources Other Than Incandescent and Xenon for Airport and Obstruction Lighting Fixtures, for additional information about design and testing.*

3.3.1 Visual Range.

The glideslope signal must be conspicuous at a range of not less than 6 statute miles (10 kilometers (km)) on a bright clear day. Interpretation of the signal (i.e., the ability to distinguish differences between each sector of the signal) must occur at not less than 4 miles (6 km) from the signal source. For the purposes of this evaluation, the term "bright clear day" is defined as a day where the visibility is 10 to 15 miles (16-24 km) with a clear sky and full sun. The glideslope signal must be observed between 10:00 AM and 3:00 PM.

3.3.2 Overall Beam Pattern.

a. Type L-882. The overall beam pattern must consist of an oval shape with the major axis parallel and the minor axis perpendicular to the plane of the runway. Isocandela curves shall be concentric ovals centered about the intersection of the major and minor axes.

b. Type L-883. The overall beam pattern must consist of a pattern shape consistent with those listed in paragraph 3.3.3 Vertical Beam Width, and paragraph 3.3.4 Horizontal Beam Width.

3.3.3 Vertical Beam Width.

a. Type L-882. Guidance must be provided relative to the on-glideslope signal over a vertical angle of not less than ±4 degrees from the axis of the on-glideslope signal. The on-glideslope signal must be distinct and be between 0.33 and 0.5 degrees wide vertically and centered on the glideslope signal axis.

b. Type L-883. Guidance must be provided relative to the on-glideslope signal over a vertical angle of not less than 2.6 degrees above, and 2.8 degrees below. The on-glideslope signal must be distinct and between 0.33 and 0.5 degrees wide vertically centered on the on-glideslope signal axis.

3.3.4 Horizontal Beam Width.

a. Type L-882. The visual signal must provide guidance relative to the approach angle over a horizontal angle of not less than ±10 degrees from the center of the light beam.

b. Type L-883. The visual signal must provide guidance relative to the approach angle over a horizontal angle of not less than ±8 degrees from the center of the light beam.

3.3.5 Visual Signal Colors.

The visual signal must consist of not less than two and not more than four horizontal color bands. Signal colors must be aviation colors red, yellow, green, or white per chromaticity requirements in SAE AS-25050. Color sectors must be distinct and identifiable throughout the horizontal beam width at all intensity settings. Only aviation red must be used to indicate the lowest below-course sector of the system. Transition zones between colors must be not more than 0.05 degree when used for color separation.

3.3.6 Signal Interpretation.

The signal must consist of multiple sectors. The sectors must be unique and indicate at a minimum above-, on-, and below-glideslope conditions.

3.3.7 Failure Mode.

The system must be designed to be fail-safe upon the occurrence of any system failure that results in an incorrect glideslope signal being transmitted from the system. The fail-safe mode is glideslope signal turned off.

3.3.8 Intensity Settings.

GVGI systems must be equipped with a photoelectric or manual control for controlling day/night intensity settings. Style A systems using photoelectric control must use one selectable night setting of approximately 5 and 20 percent of full daylight intensity. Style B systems must operate from a constant current regulator (CCR) with a current range of 2.8 to 6.6 Amperes (five step CCR). The intensity of a Style B GVGI is controlled by the tap settings on the CCR (manual control) or via an automatic photoelectric control.

3.3.9 Light Pulse Frequency and Duration.

If used, the manufacturer must specify the frequency and duration of any pulsing lights.

3.3.10 Lamp Life.

The lamps must be commercially available types using standard lamp holders and have a minimum lamp useful life of 1000 hours when operated at the high intensity setting. Automatic lamp changing may be used to comply with this requirement provided that the glideslope signal interruption is not more than 2

seconds. Lamp life testing must be used to define lamp life. See AC 150/5345-53C, Appendix 5, *Lamp Life Test Procedure,* for test procedures and a definition of lamp useful life.

3.3.11 Light Unit Construction.

Each projector unit must be designed with the following characteristics:

a. **Environmental Loads.** Dynamic and static environmental loads due to wind, snow, and other factors must not cause misalignment of the light signal.

b. **Weight.** The weight of the complete unit must not exceed 150 pounds (lbs) (68 kilograms (kg)). If transformers are mounted separately, this weight shall be reduced to 100 lbs. (45 kg).

c. **Height.** When installed in its minimum configuration, the complete equipment installation must not exceed 40 inches (1 meter) from ground level to the top of the unit.

d. **Enclosure.** Equipment enclosures must be resistant to material degradation caused by ultraviolet radiation. In addition, the enclosure must prevent rain and snow from degrading the light signal photometric characteristics.

e. **Start up.** The visual signal must display correct color characteristics and intensities within 5 seconds of turn on.

f. **Filters and Lenses.** Filters and lenses must be stable and not change their photometric characteristics under all operating conditions.

3.3.12 Mounting Provisions.

The light units must provide for mounting on a maximum of three frangible couplings (see FAA Drawing C 6046 for frangible coupling details and frangibility requirements) and be suitable for mounting on a level concrete pad. Hardware must be provided for leveling the unit and be designed to prevent displacement of the optical system due to vibration. Alternate mounting systems may be proposed which provide equivalent rigidity, frangibility, and adjustment.

3.3.13 Aiming.

The light unit(s) must be provided with integral adjustments to permit vertical positioning of the "on-glideslope" signal axis at any elevation between 1 and 12 degrees ±0.08 degree. A separate aiming device may be furnished with the equipment to set the signal axis vertical angle.

3.3.14 Tilt Device.

All systems must be provided with a device that de-energizes all projector unit(s) when the on-glideslope signal axis is misaligned between 0.25 and 0.5 degree below or between 0.5 and 1.0 degree above the preset on-glideslope angle. A time delay of 10 to 30 seconds must be included to prevent intermittent tilt device activation caused by vibration. Adjustments must be provided to simulate excessive tilt conditions for checking the proper operation of the tilt device.

3.3.15 System Control.

System control must be designed as specified by the user for remote manual, radio, or photoelectric control or any combination of these.

a. Remote Manual Control. The remote manual control may use either 120VAC or 48VDC.

b. Radio Control. The radio control must be per AC 150/5345-49. The radio control must activate the system and, if required, select the proper intensity setting.

c. Photoelectric Control. The photoelectric control unit must automatically select the pre-set day or night intensity setting. The control unit must select the day intensity as the illumination on the photocell rises to 50-60 footcandles (540-645 lux) and the night intensity as the illumination drops to 25-35 footcandles (270-375 lux). A time delay of 45 to 75 seconds must be incorporated to prevent switching caused by transient light and shadows. In the event of photoelectric control failure, the system must revert to the low intensity setting. Style A systems must select the low night intensity setting for 3 seconds before switching to the day intensity setting.

3.3.16 Lightning Surge Protection.

Power units of Style A systems must withstand lightning transients per IEEE C62.41 - 1991, Category C1.

3.3.17 Style A Systems.

Style A systems must operate from any standard utility single-phase alternating current service voltage less than 600 volts.

3.3.18 Style B Systems.

Style B systems must operate from a constant-current regulator with a current range of 2.8 to 6.6 amperes per AC 150/5345-10. The system must be compatible with isolation transformers per AC 150/5345-47.

3.3.19 Grounding.

Conductive materials enclosing electrical conductors, equipment, or housing part of the equipment must be grounded to a common lug to allow connection to a system ground conductor.

3.3.20 Power Cables.

The equipment must be provided with power cables having factory molded plugs. Style A systems may use any plug with adequate capacity and electrical performance equivalent to that of an L-823 plug per AC 150/5345-26. The length of cable must be less than 1.5 feet (75 centimeters). Style B systems must have class A, style 1 or 6 plugs per AC 150/5345-26, *FAA Specification for L-823 Plug and Receptacle, Cable Connectors,* to mate with isolation transformer outputs.

3.3.21 Equipment Color.

The exterior color of all units must be either bright orange or yellow.

3.3.22 Identification Label.

Each fixture or unit must be marked with a permanent label stating the manufacturer's name and address, the equipment name, number, type, style, class, and the electrical rating (worst case volt-amps).

3.3.23 Hardware.

All hardware must be selected to prevent corrosion and galling.

3.3.24 Maintenance.

System components must be designed to allow replacement. The equipment must be designed so that adjustments and repairs can be made with standard tools.

3.4 Workmanship.

Wiring must be neatly run and bundled. All wiring must be marked by color coding or tagging. Wire marking must be consistent with the instruction book schematics and troubleshooting diagrams. Sharp edges and burrs must be removed. Painted surfaces must be free from runs, blotches, and scratches.

3.5 Instruction Book.

An instruction book containing the following information must be furnished with each system:

a. A complete schematic and wiring diagrams referencing wire markings and showing all components cross-indexed to the manufacturer's parts list. Wire markings on the schematic must be identical to the markings on the equipment.

b. A complete parts list with each circuit component keyed to the designation assigned on schematics for wiring diagrams. Complete information must be given for each part to permit ordering for replacement purposes. This information shall include the component's rating, name of the manufacturer, and the manufacturer's part number.

c. Installation instructions, including aiming, sighting criteria, calibration of the aiming system, focusing, and adjustment of the tilt device.

d. A physical description, including photographs or drawings with sufficient detail to identify the equipment components.

e. Maintenance instructions, including re-lamping procedure, theory of operation, and trouble-shooting charts.

f. Equipment operating instructions.

CHAPTER 4. TESTING.

4.1 Testing Phases.

Testing must consist of signal concept flight evaluation (Phase 1 Tests) and equipment performance testing (Phase 2 Tests). Phase 2 tests must be conducted in the specified sequence on the same unit(s) used in the Phase 1 tests. The test sequence is designed to simulate accelerated environmental effects.

4.1.1 Phase 1 Tests.

Phase 1 tests consist of the signal concept flight evaluation tests and must include the following documents and any revisions as required for approval:

a. Flight Evaluation Test Report

b. Approved design data package including detailed drawings

c. Signal characteristics

d. Photometric data package

e. Description of principles of operation

f. Lamp life test procedure

These documents must be on file at the FAA Airport Engineering Division (AAS-100, FAA Headquarters, Washington, DC) prior to the start of Phase 2 tests.

4.1.2 Phase 2 Tests.

The equipment to be subjected to Phase 2 tests must be the equipment intended for production. Unless specifically directed in the test procedures referenced by this specification, equipment may not be disassembled or cleaned once the test sequence has begun.

NOTE: *Perform a photometric test prior to conducting any Phase 2 Tests to confirm that the visual glideslope equipment meets the same criteria established in the photometric data package in paragraph 4.1.1d.*

4.1.3 Phase 2 Acceptance Criteria.

4.1.3.1 Light Pulse Frequency and Duration.

If used, the frequency and duration of the light pulses must be within the manufacturer's specifications.

4.1.3.2 Safety Features.

Any deterioration or reduction in safety feature performance must be cause for test failure.

4.1.3.3 Loss of Signal.

Loss of the glideslope signal must be cause for test failure.

4.1.3.4 Visual Examination.

The equipment must be inspected for compliance with the requirements for size, weight, materials, finish, identification label, and quality of workmanship. Failure to meet weight and size restrictions must be cause for rejection.

4.1.4 Phase 2 Tests.

4.1.4.1 Solar Radiation Test.

A sunshine test must be conducted per MIL-STD-810F, Method 505.4, Procedure II for nonmetallic exterior parts. The material must be subjected to 56 cycles. If plastic optical lenses or light emitting covers are used, their photometric performance must be measured after this test. A certificate of compliance from the plastic manufacturer attesting that the material has previously passed the MIL-STD-810F requirement may be provided in lieu of performing this test (subject to third party certification body approval).

4.1.4.2 Humidity Test.

The humidity test must be per MIL-STD-810F, Method 507.4, Procedure, paragraph 4.5.2. The equipment must be subjected to two complete cycles per Figure 507.4-1, except the maximum temperature must be +130 degrees F (+55 degrees C). At the conclusion of testing, inspect the equipment and components. Any evidence of corrosion, discoloration, swelling, or cracking will be cause for rejection.

4.1.4.3 Low Temperature Test.

A low temperature test must be conducted per MIL-STD-810F, Method 502.4, Procedure. The equipment must be exposed to a minimum of -30 degrees F (-35 degrees C) for Class I systems or -65 degrees F (-55 degrees C) for Class II systems for 24 hours. Projector unit(s) must be initially de-energized and then energized during the last 12 hours of the test. Failure of the equipment to operate will be cause for rejection.

4.1.4.4 Salt-Fog Test.

A salt-fog test must be conducted MIL-STD-810F, Method 509.4, Procedure I. The equipment must be cycled for 48 hours exposure and 48 hours drying. At the conclusion of testing, analyze any corrosion for its immediate and potential long-term effects on the proper functioning and structural integrity of the equipment.

4.1.4.5 Wind Loading.

Static force tests (an equivalent force derived from wind velocity in paragraph 3.2d) must be conducted to ensure that the system will withstand the specified wind load from any direction in azimuth without displacing the optical pattern more than allowed in the snow and ice-loading test per paragraph 4.1.4.6.

4.1.4.6 Snow and Ice Loading Test.

A uniformly distributed load of 15 pounds per square foot (73 kilograms per square meter) must be applied over the entire top surface of the projector unit(s). Before applying the load, the unit must be set up and the light pattern displayed on a vertical surface 20 feet (6 meters) from the front of the unit. The top, bottom, and the sides of the beam pattern and any other characteristic features must be marked on the

wall. After loading the unit with the required amount of material, the beam pattern must be checked for displacement from the markings, and the load must be left in place for 5 hours. Upon removal of the load, the beam pattern must again be checked against the original markings. The beam pattern must remain within +l/4 inch (6 millimeters) of the original markings.

4.1.4.7 Photometric Tests.

The light units must be tested after the tests in paragraph 4.1.4.1 through 4.1.4.6 are completed to ensure equipment compliance with the photometric data in paragraph 4.1.2. A certificate of compliance from the manufacturer of lenses and color filters may be used to meet the chromaticity requirements of SAE AS 25050. Photometric test equipment must be calibrated and traceable to the National Bureau of Standards.

4.1.4.7.1 Computation of Effective Intensity.

The effective intensity of flashing lights must be calculated per the following formula. Intensities that are 90 percent or more of those specified by the manufacturer are acceptable.

$$I_e = \int_{t_1}^{t_2} I dt / (0.2 + (t_2 - t_1))$$

Where:

I_e = Effective intensity (K candela)
I = Instantaneous intensity (K candela)
t_1, t_2 = Integration limits (seconds)

The limits of integration must be selected so that the value of I is maximized

4.1.4.8 Frangibility Test.

The manufacturer must demonstrate that the frangibility is not less than that provided by an equal number (not to exceed three), 2-inch (50 millimeter) frangible couplings per FAA drawing C-6046. This may be demonstrated by measuring the force required to break the coupling.

4.1.4.9 Aiming Tests.

The vertical and horizontal adjustment ranges of the light units must be measured for compliance with the requirements of paragraph 3.3.13, Aiming. The aiming device must be tested using a procedure submitted by the manufacturer and approved by the third party certification body. It must be demonstrated that when the light unit is moved via the adjustment mechanism, the measuring device registers the change within the allowable tolerance. The measuring device must be checked at one degree intervals throughout the system's adjustment range.

4.1.4.10 Lightning Surge Test.

For Style A systems, the power input lines must be tested for resistance to lightning transients per IEEE C62.41, Category C1. Apply 2 pulses of a Category C1 combination wave at 15 second intervals to the power line inputs per test methods described in IEEE C62.45, *IEEE Recommended Practices on Surge Testing for Equipment Connected to Low-Voltage (1,000 volts and less) AC Power Circuits.* Failure of the equipment to operate will be cause for rejection.

4.2 Operational Test.

An operational test using the manufacturer's test procedure approved by the third party certification body must be conducted to demonstrate compliance with all equipment operating requirements. The procedure must test the tilt device, power supply performance, photoelectric controller, and any other operational features. If more than one lamp is used in a projector, the system must be operated with one lamp out in each projector to demonstrate that the proper voltage or current is still applied at the terminals of the remaining operational lamps. The manufacturer must demonstrate that the failure of a lamp will not produce transients that could damage the remaining lamps. In addition, it must be demonstrated that an automatic lamp changer (if part of the equipment design) is functional and changes lamps per paragraph 3.3.10.

4.2.1 Lamp Life Testing.

Lamp life testing must be performed per AC 150/5345-53, Appendix 5.

CHAPTER 5. PRODUCTION TESTING

5.1 Production Tests.

The manufacturer must use a test procedure to verify the light output and aiming device accuracy for each production unit. After submission to and approval by the third party certification body, the test procedures must be used for all production units. The visual examination (paragraph 4.1.3.4), aiming test (paragraph 4.1.4.9), and the operational test (paragraph 4.2) must also be performed for each visual glideslope system.

5.2 Production Test Records.

Records showing actual test results of all tests required in paragraph 5.1 must be maintained for three years by the manufacturer. The records must be traceable to the units tested by serial number.

Intentionally left blank.